



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/717,106	11/19/2003	Robert W. Hyland JR.	020838	7335

23464 7590 12/02/2004

BUCHANAN INGERSOLL, P.C.
ONE OXFORD CENTRE, 301 GRANT STREET
20TH FLOOR
PITTSBURGH, PA 15219

EXAMINER

KOSLOW, CAROL M

ART UNIT	PAPER NUMBER
----------	--------------

1755

DATE MAILED: 12/02/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/717,106

Applicant(s)

HYLAND ET AL.

Examiner

C. Melissa Koslow

Art Unit

1755

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-16 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-16 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 19 November 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. ____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|--|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>2/19/04</u> | 6) <input type="checkbox"/> Other: ____ |

Applicant's claim for domestic priority under 35 U.S.C. 119(e) is acknowledged. However, the provisional application upon which priority is claimed fails to provide adequate support under 35 U.S.C. 112 for claims 1-11 and 13-15 of this application.

The provisional application only teaches photoluminescent strontium aluminates doped with europium, scandium and optionally at least one other rare earth metal, such as dysprosium and gadolinium. The provisional application teaches the aluminate can be produced by combining strontium carbonate and alumina to form SrAl_2O_4 and carbon dioxide and that the materials are heated at 1100-1350°C in a reducing atmosphere to form the phosphor. The subject matter of claims 1-11 and 13-15 are not found in the provisional application.

JP 56-2116 cited in the information disclosure statement filed 19 February 2004 fails to comply with 37 CFR 1.98(a)(3) because it does not include a concise explanation of the relevance, as it is presently understood by the individual designated in 37 CFR 1.56(c) most knowledgeable about the content of the information, of each patent listed that is not in the English language. It has been placed in the application file, but the information referred to therein has not been considered.

The abstract of the disclosure does not commence on a separate sheet in accordance with 37 CFR 1.52(b)(4). A new abstract of the disclosure is required and must be presented on a separate sheet, apart from any other text.

The disclosure is objected to because of the following informalities: The degree symbols are missing from all temperatures. Paragraph 0016 refers to a base alloy comprising strontium, but there is no alloys, which are metal, discussed in the specification. Applicant needs to clarify what is meant by this phrase. Appropriate correction is required.

Art Unit: 1755

The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o). Correction of the following is required: The subject matter of claims 1-11 is not found in the specification.

Claims 12, 14, 15 and 16 are objected to because of the following informalities: “°c” should be “°C” in claims 14 and 15. Claims 12 and 16 are missing the period at the end of the claims. Appropriate correction is required.

Claims 1, 4, 5 and 8-16 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 1, 4, 5 and 8-11 are indefinite since applicants define a strontium aluminate as an alloy. Where applicant acts as his or her own lexicographer to specifically define a term of a claim contrary to its ordinary meaning, the written description must clearly redefine the claim term and set forth the uncommon definition so as to put one reasonably skilled in the art on notice that the applicant intended to so redefine that claim term. *Process Control Corp. v. HydReclaim Corp.*, 190 F.3d 1350, 1357, 52 USPQ2d 1029, 1033 (Fed. Cir. 1999). The term “base alloy” in claims 1, 4, 5 and 8-11 is used by the claim to mean “aluminate”, which is a nonmetallic compound of aluminum, oxide and at least one other element, while the accepted meaning is “a mixture of two or more elements which has a metallic appearance and which is not a molecular mixture, a colloidal mixture or a compound, such as an oxide.” The term is indefinite because the specification does not clearly redefine the term.

Claims 12 and 16 are rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential steps, such omission amounting to a gap between the steps.

Art Unit: 1755

See MPEP § 2172.01. The omitted steps are: the step of reacting the materials to form the aluminate.

Claim 13 is indefinite since the reaction is incorrect. The reaction of strontium carbonate and alumina would form strontium aluminate and carbon dioxide, not strontium aluminate and ozone. It is noted that the reaction in the specification is correct.

The process in claims 14 and 15 is confusing as written. The process in the specification is to form SrAl_2O_4 by calcining the mixture and heating the mixture at approximately 1300 or 1450°C to form the photoluminescent aluminate. It is suggested to rewrite these claimed to correspond to the process in the specification.

Finally, claim 16 is indefinite since it states “according to the method described above” but there is no indication where this method is located in this claim and the amounts require the presence of dysprosium, but the preamble teaches an aluminate with dysprosium. It is suggested to rewrite this claim as follows or in a similar manner:

A photoluminescent aluminate selected from $\text{Sr}_4\text{Al}_{14}\text{O}_{25}$: Eu, Sc and $\text{Sr}_4\text{Al}_{14}\text{O}_{25}$: Eu, Sc, Dy wherein the following materials and quantities are combined and reacted to form the aluminate:

SrCO_3 (4.0 mole)

Al_2O_3 (7.0 mole)

Eu_2O_3 (0.005 mole)

Sc_2O_3 (0.005 mole)

B_2O_3 (0.2 mole)

Dy_2O_3 (0 mole or 0.005 mole).

Art Unit: 1755

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claim 1 is rejected under 35 U.S.C. 102(b) as being clearly anticipated by U.S. patent 3,502,592.

This patent teaches photoluminescent strontium aluminate comprising europium and terbium dopants. The reference clearly teaches the claimed aluminate.

Claims 1, 2 and 5 are rejected under 35 U.S.C. 102(b) as being clearly anticipated by applicants' admissions in paragraphs 5 and 7; U.S. patent 5,424,006 or U.S. patent 6,267,911.

Applicants admits in paragraphs 5 and 6 that photoluminescent strontium aluminates having the formulas $\text{SrAl}_2\text{O}_4:\text{Eu}$ and $\text{SrAl}_2\text{O}_4:\text{Eu,Dy}$ were known at the time of invention. The U.S. patents also teach the claimed aluminates. U.S. patent 5,424,006 teaches this in examples 1 and 2. U.S. patent 6,267,911 teaches the claimed aluminates in column 1, lines 30-45, column 6, lines 1-12; column 8, lines 15-26 and the examples.

Claims 1, 4, 5 and 9 are rejected under 35 U.S.C. 102(b) as being clearly anticipated by EP 94,132.

Table V teaches an aluminate phosphor having the formula SrAl_4O_7 and containing Eu as the dopant. The reference clearly teaches the claimed composition.

Claims 1 and 4-8 are rejected under 35 U.S.C. 102(b) as being clearly anticipated by U.S. patent 6,261,477.

Art Unit: 1755

This reference teaches a photoluminescent strontium aluminates doped with europium and scandium and which further contain boron. Column 4, lines 60 and 62 teaches phosphors having the formulas $\text{SrO} \cdot \text{Al}_2\text{O}_3 \cdot 0.004\text{Sc}_2\text{O}_3 \cdot 0.02\text{B}_2\text{O}_3 \cdot 0.006\text{Eu}_2\text{O}_3$ and $\text{SrO} \cdot \text{Al}_2\text{O}_3 \cdot 0.008\text{Sc}_2\text{O}_3 \cdot 0.02\text{B}_2\text{O}_3 \cdot 0.006\text{Eu}_2\text{O}_3$. These formulas can be rewritten as $\text{SrAl}_2\text{O}_4 : 0.006\text{Eu}, 0.02\text{B}, x\text{Sc}$, where x is 0.004 or 0.008. The molar percentages of scandium in these compounds are 0.4 or 0.8 mol%. These amounts fall within that of claim 7. The comparative example in table 1 has the formula $\text{SrO} \cdot 1.75\text{Al}_2\text{O}_3 \cdot 0.06\text{B}_2\text{O}_3 \cdot 0.004\text{Eu}_2\text{O}_3$. This formula can be rewritten as $\text{Sr}_4\text{Al}_{14}\text{O}_{25} : \text{Eu}, \text{B}$. The reference teaches the claimed aluminates.

Claims 1, 2, 4, 5, 8 and 9 are rejected under 35 U.S.C. 102(b) as being clearly anticipated by U.S. patent 6,177,362.

This reference teaches photoluminescent strontium aluminates doped with europium and at least one other trivalent metal ion. The examples show that the aluminate also can contain boron. Example 7 teaches $\text{SrAl}_4\text{O}_7 : \text{Eu}, \text{Dy}$ which further contains B. Example 14 teaches $\text{Sr}_4\text{Al}_{14}\text{O}_{25} : \text{Eu}, \text{Pr}$ which further contains boron.

Claims 1, 2 and 4-8 are rejected under 35 U.S.C. 102(b) as being clearly anticipated by 6,010,644.

Table 3 teaches $\text{SrO} \cdot \text{Al}_2\text{O}_3 \cdot 0.02\text{Sc}_2\text{O}_3 \cdot 0.02\text{B}_2\text{O}_3 \cdot 0.005\text{Eu}_2\text{O}_3 \cdot 0.005\text{Dy}_2\text{O}_3$ and $\text{SrO} \cdot \text{Al}_2\text{O}_3 \cdot 0.032\text{Sc}_2\text{O}_3 \cdot 0.02\text{B}_2\text{O}_3 \cdot 0.005\text{Eu}_2\text{O}_3 \cdot 0.005\text{Dy}_2\text{O}_3$ and $\text{SrO} \cdot \text{Al}_2\text{O}_3 \cdot 0.032\text{Sc}_2\text{O}_3 \cdot 0.02\text{B}_2\text{O}_3 \cdot 0.005\text{Eu}_2\text{O}_3 \cdot 0.005\text{Dy}_2\text{O}_3$. These formulas can be rewritten as $\text{SrAl}_2\text{O}_4 : 0.005\text{Eu}, 0.005\text{Dy}, 0.02\text{B}, x\text{Sc}$, where x is 0.02 or 0.032 and $\text{SrAl}_2\text{O}_4 : \text{Eu}, \text{Dy}$. The molar percentages of scandium in these compounds are 2 or 3.2 mol%. When x is 0.02, then the amount of scandium falls within that of claim 7. The comparative example in table 4 has the

Art Unit: 1755

formula $\text{SrO} \cdot 1.75\text{Al}_2\text{O}_3 \cdot 0.06\text{B}_2\text{O}_3 \cdot 0.004\text{Eu}_2\text{O}_3 \cdot 0.005\text{Dy}_2\text{O}_3$. This formula can be rewritten as $\text{Sr}_4\text{Al}_{14}\text{O}_{25} \cdot \text{Eu, B, Dy}$. The reference teaches the claimed aluminates.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. patent 6,267,911 or U.S. patent 6,117,362.

As discussed above, both of these references teach photoluminescent strontium aluminates doped with europium and at least one other trivalent metal ion. Column 8 of both references teaches photoluminescent strontium aluminates doped with europium and two different trivalent metal ions, where the trivalent metal ions are selected from the group consisting of Pr, Ho, Nd, Dy, Er, La, Lu, Ce, Y, Sm, Gd, Tb, Tm, Yb and Bi. Thus the reference suggests to one of ordinary skill in the art a dopant combination of Eu, Dy and Gd. The references make obvious the claimed aluminate.

Claims 1, 4-11 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. patent 6,261,477.

This reference teaches a photoluminescent aluminate having the formula $\text{MO} \cdot a(\text{Al}_{1-x}\text{Ga}_x)\text{O}_3 \cdot b\text{Sc}_2\text{O}_3 \cdot c\text{B}_2\text{O}_3 \cdot d\text{Eu}$, where M is Zn or an alkaline earth metal, a is 0.3-8, c is 0.001-0.3, d is 0.001-0.3, $0 < b \leq 0.2$ and $0 \leq x < 1.0$. The examples show that one of the preferred M elements is Sr, that x can be 0 and that a can be 1 or 1.75. Thus the reference suggests aluminates having the formulas $\text{SrO} \cdot \text{Al}_2\text{O}_3 \cdot b\text{Sc}_2\text{O}_3 \cdot c\text{B}_2\text{O}_3 \cdot d\text{Eu}$ and $\text{SrO} \cdot 1.75\text{Al}_2\text{O}_3 \cdot b\text{Sc}_2\text{O}_3 \cdot c\text{B}_2\text{O}_3 \cdot d\text{Eu}$. These

Art Unit: 1755

formulas can be rewritten as $\text{SrAl}_2\text{O}_4:\text{dEu},\text{bSc},\text{cB}$ and $\text{Sr}_4\text{Al}_{14}\text{O}_{25}:\text{dEu},\text{bSc},\text{cB}$. When b is converted to molar percentage, the amount of scandium in the phosphor is 2 mol% or less. This range overlaps the claimed range. Product claims with numerical ranges which overlap prior art ranges were held to have been obvious under 35 USC 103. *In re Wertheim* 191 USPQ 90 (CCPA 1976); *In re Malagari* 182 USPQ 549 (CCPA 1974); *In re Fields* 134 USPQ 242 (CCPA 1962); *In re Nehrenberg* 126 USPQ 383 (CCPA 1960).

The reference suggests the formula $\text{Sr}_4\text{Al}_{14}\text{O}_{25}:\text{Eu},\text{Sc}$ in claim 16, assuming the 35 USC 112 rejection of claim 16 is overcome. The reference teaches the aluminate are formed by combining stoichiometric amounts of the desired aluminate and reacting them to form the aluminate and that the strontium source can be strontium carbonate and that the other metal sources can be oxides (col. 2, lines 50-67).

While the reference does not exemplify SrAl_4O_7 , which forms when a is 2, it does suggest this formula since 2 falls within the taught a range and photoluminescent strontium aluminates doped with europium are known in the art. The reference suggests the claimed aluminates.

Claims 1, 2, 4-11 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. patent 6,261,477.

This reference teaches a photoluminescent aluminate having the formula $\text{MO}\cdot\text{a}(\text{Al}_{1-x}\text{Ga}_x)\text{O}_3\cdot\text{bSc}_2\text{O}_3\cdot\text{cB}_2\text{O}_3\cdot\text{dEu}\cdot\text{eR}$, where M is Zn or an alkaline earth metal, R is a trivalent metal ion, a is 0.3-8, c is 0.001-0.2, d is 0.001-0.3, e is 0.001-0.3, $0 < \text{b} \leq 0.2$ and $0 \leq \text{x} < 1.0$. The examples show that one of the preferred M elements is Sr, one of the preferred R ions is dysprosium, that x can be 0 and that a can be 1 or 1.75. Thus the reference suggests aluminates having the formulas

Art Unit: 1755

$\text{SrO} \bullet \text{Al}_2\text{O}_3 \bullet b\text{Sc}_2\text{O}_3 \bullet c\text{B}_2\text{O}_3 \bullet d\text{Eu} \bullet e\text{Dy}$ and $\text{SrO} \bullet 1.75\text{Al}_2\text{O}_3 \bullet b\text{Sc}_2\text{O}_3 \bullet c\text{B}_2\text{O}_3 \bullet d\text{Eu} \bullet e\text{Dy}$. These formulas can be rewritten as $\text{SrAl}_2\text{O}_4:d\text{Eu},b\text{Sc},c\text{B},e\text{Dy}$ and $\text{Sr}_4\text{Al}_{14}\text{O}_{25}:d\text{Eu},b\text{Sc},c\text{B},e\text{Dy}$. When b is converted to molar percentage, the amount of scandium in the phosphor is 2 mol% or less. This range overlaps the claimed range. Product claims with numerical ranges which overlap prior art ranges were held to have been obvious under 35 USC 103. *In re Wertheim* 191 USPQ 90 (CCPA 1976); *In re Malagari* 182 USPQ 549 (CCPA 1974); *In re Fields* 134 USPQ 242 (CCPA 1962); *In re Nehrenberg* 126 USPQ 383 (CCPA 1960).

The reference suggests the formula $\text{Sr}_4\text{Al}_{14}\text{O}_{25}:\text{Eu},\text{Sc},\text{Dy}$ in claim 16, assuming the 35 USC 112 rejection of claim 16 is overcome. The reference teaches the aluminate are formed by combining stoichiometric amounts of the desired aluminate and reacting them to form the aluminate and that the strontium source can be strontium carbonate and that the other metal sources can be oxides (col. 5, lines 10-20).

While the reference does not exemplify SrAl_4O_7 , which forms when a is 2, it does suggest this formula since 2 falls within the taught a range and photoluminescent strontium aluminates doped with europium are known in the art. The reference suggests the claimed aluminates.

Claims 12-15 would be allowable if rewritten or amended to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action.

There is no suggestion or teaching in the cited art of record to include gadolinium as a co-dopant in $\text{SrAl}_2\text{O}_4:\text{Eu},\text{Dy},\text{Sc}$. The closest art is U.S. patent 6,010,644. None of the strontium and either scandium or yttrium containing the examples comprises a third trivalent dopant. Thus

Art Unit: 1755

there is no motivation to include gadolinium as well as dysprosium in the taught phosphor formula.


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Melissa Koslow whose telephone number is (571) 272-1371. The examiner can normally be reached on Monday-Friday from 8:00 AM to 3:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark Bell, can be reached at (571) 272-1362.

The fax number for all official communications is (703) 872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

cmk
November 30, 2004


C. Melissa Koslow
Primary Examiner
Tech. Center 1700